GUIDANCE FOR REMEDIATION OF PETROLEUM CONTAMINATED MEDIA

OVERVIEW

Petroleum remediation projects using soil vapor extraction or air stripping remove petroleum contamination from the ground and groundwater. The contamination could otherwise interfere with beneficial uses of the site, of adjacent properties to which the contamination plume could migrate, and of the groundwater. Therefore, it is imperative to begin remediation as soon as possible to limit the amount and extent of the contamination.

The Department of Environmental Quality (Department) has developed the following guidance regarding these types of petroleum remediation projects that are specifically exempted by the Department from air permitting requirements and is designed to facilitate the rapid remediation of petroleum contaminated sites. This guidance addresses the air quality permitting/exemption requirements of IDAPA 58.01.01.222.03, as well as the State requirements of the UST/LUST program. Remediation projects that do not meet the air pollution requirements of this guidance must either self-exempt in accordance with the Rules for the Control of Air Pollution in Idaho (IDAPA 58.01.01)(*Rules*) or obtain a permit to construct.

Sources with the potential to emit air contaminants greater than or equal to 100 tons per year for volatile organic compounds (VOCs), 10 tons for any individual hazardous air pollutant (HAP), or 25 tons per year for combined HAPs are required to evaluate the applicability of Tier I operating permit requirements.

Some of the provisions of the *Rules* are not in the EPA-approved State Implementation Plan (SIP). Therefore, there is a risk that sources exempting using the guidance may be subject to EPA enforcement action.

More refined or further modeling by the owner/operator is acceptable. This guidance includes tables showing the results of SCREEN3 dispersion modeling runs which conservatively estimate the ambient impact of the given emissions. These tables may be used to estimate the acceptable emissions of benzene.

This guidance is limited to the following remediation activities:

1. Petroleum remediation only (not industrial solvents or other remediation projects).
2. Annual uncontrolled VOC emissions of less than 100 tons per year (IDAPA 58.01.01.220.01.a.i).
3. For major sources, annual uncontrolled VOC emissions of less than 40 tons per year (IDAPA 58.01.01.220.a.ii).
4. Not part of a new major facility or part of a proposed major modification (IDAPA 58.01.01.220.01.b).
5. An operational life of no more than five years (not for landfills) (IDAPA 58.01.01 006.34).
6. If the source is near a sensitive receptor (refer to definition in this section), a short term factor, which allows ten times higher toxics emissions than for long-term projects, cannot be used.
7. If the project involves a RCRA Subtitle I Underground Storage Tank, review Figure 1, RCRA Regulatory Status of Contaminated Media flowchart.

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DETERMINING WHETHER AND HOW TO USE THIS GUIDANCE

After checking the list in the overview section of this guidance for applicability, use the RCRA Regulatory Status of Contaminated Media flowchart (see Figure 1), the vapor extraction or air stripping forms, and the Dispersion Modeling Result Tables to assist with the steps listed here.

I. Verify compliance with RCRA regulations (see Figure 1, RCRA Regulatory Status of Contaminated Media flowchart).

II. Determine if the site is within 500 feet of a sensitive receptor as defined in IDAPA 58.01.01.007.10. If so, contact the Department.

III. Estimate annual uncontrolled VOC emissions. The constants used in the equations to obtain tons per year of VOC were derived by the following methods:

Vapor extraction:

Constant derivation: micrograms/liter x ft^3/min x 28.32 liter/ft^3 x 525,600 min/yr x 1 g/10^6 micrograms x 1 lb/454 g x 1 ton/2,000 lb = 1.64E-5

Air stripping:

Constant derivation: micrograms/liter x liter/min x 525,600 min/yr x 1 g/10^6 micrograms x 1 lb/454 g x 1 ton/2,000 lb = 5.8E-7

Compare the amount to major source trigger levels as specified in the forms.

IV. Calculate the uncontrolled benzene emissions. The constant used in the equation was derived in the same manner as in the VOC ton per year calculation. Depending on the amount of benzene emitted, emission controls and/or dispersion modeling may be required.

V. Determine whether the operation can be exempted without case-specific dispersion modeling, using the charts on the pages following the forms. These charts were created using the air dispersion model SCREEN3. The inputs into the model were stack height, stack diameter, either no significant structures or one significant structure (100 ft by 100 ft by 15 ft high), stack temperature of 298 K, flat terrain, and urban default. SCREEN3 was run using many different emission rates and stack heights. The minimum stack exit air flow rate was determined by iteration in each case that resulted in the maximum allowable benzene concentration (1.2 micrograms per cubic meter, which includes the short term factor). Any flow rate above the amount shown in the table would result in a lower maximum modeled concentration of benzene. Therefore, the flow rates in the table are minimum required flow rates.

VI. Pilot test information, air emissions sampling procedures, and an example of a sampling schedule are included in this document. The sampling schedule for each operation may be much different from the example (more or less sampling) and should be set up according to what the site manager determines to be needed to be confident that the allowed emissions are not being exceeded.

VII. A discussion of the IDAPA rules used to formulate this guidance are included in the last section, Regulatory Review.

RCRA REGULATORY STATUS OF CONTAMINATED MEDIA FLOWCHART

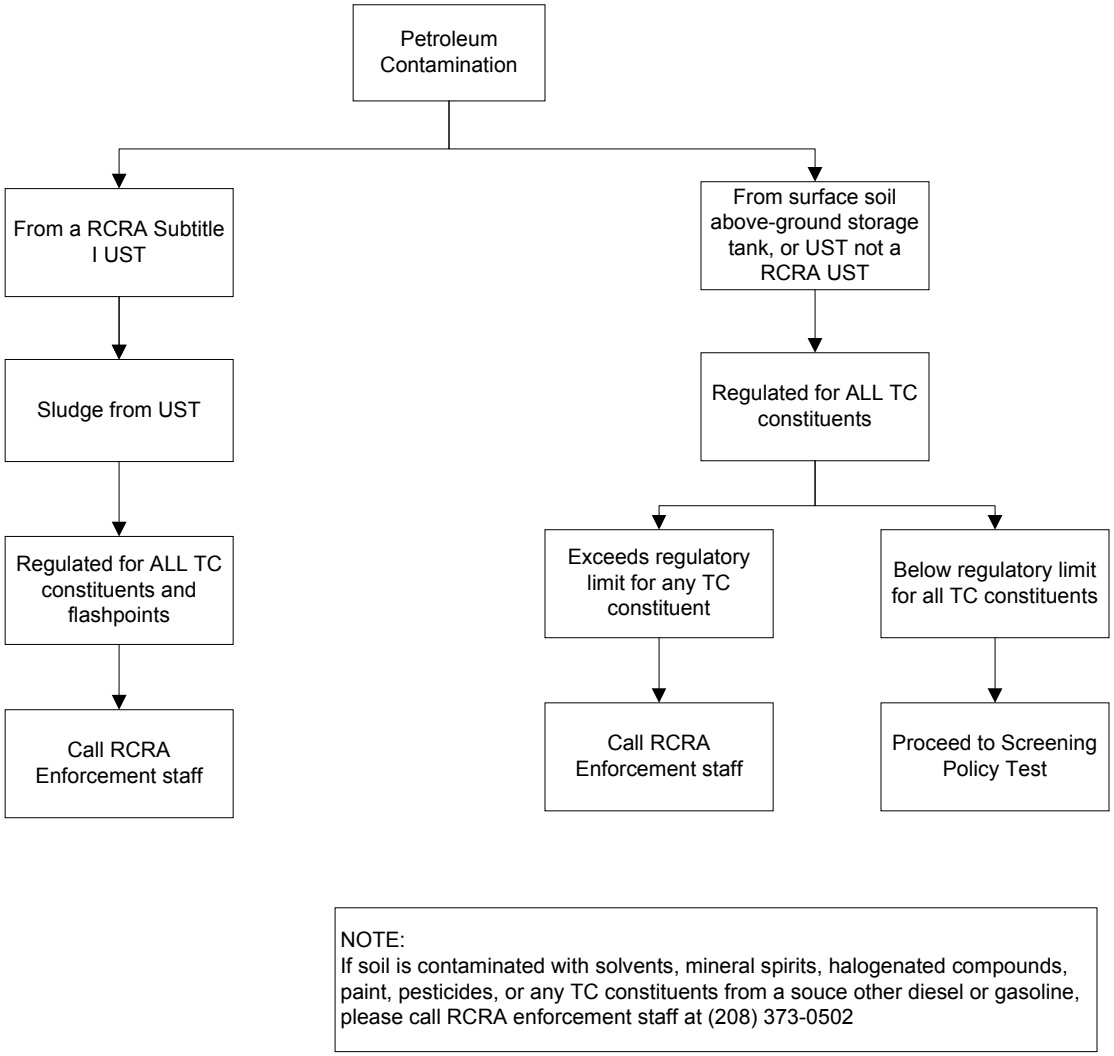

Figure 1. RCRA Regulatory Status of Contaminated Media

If the diagram indicates "Call RCRA enforcement staff," do so before using this guidance document.

VAPOR EXTRACTION EXEMPTION FORM

Company/Facility Name:
Facility Address:

Please include a to-scale plot plan with emission(s) point(s) and location of sensitive receptor(s), if any.

I. RCRA APPLICABILITY

Verify compliance with all applicable RCRA Regulations (See Figure 1, RCRA Regulatory Status of Contaminated Media flowchart). This guidance can only be used in compliance with RCRA regulations.

II. PRESENCE OF SENSITIVE RECEPTORS

If the proposed vapor extraction site is located within 500 feet of a sensitive receptor as defined in IDAPA 58.01.01.007.10, contact the Department Air Program Office, (208) 373-0502.

III. CALCULATE UNCONTROLLED VOC LEVELS IN AIR EMISSIONS

A. Proposed flow rate of air from the vapor extraction system. The proposed flow rate must have appropriate Department approval after interim operation. The proposed flow rate must be sufficient to adequately control, contain, and remove (in a 5 year period) the petroleum contamination, or in the case of bio-remediation, be adequate to facilitate bio-remediation activity.

_____ ft^3/min

B. Determine the maximum VOC emissions rate expected. You must conduct a pilot test (see "General Guidelines for Pilot Tests") to determine the expected maximum VOC emissions rate for the vapor extraction system. Enter the VOC concentration and convert to tons per year VOC:

_____ micrograms per liter (max. value detected) x _____ ft^3/min (from A) x 1.64E-5 = _____ T/yr VOC

C. If the remediation site is located at a major facility as defined in IDAPA 58.01.01.006.55, uncontrolled VOC emissions must be less than 40 T/yr to use this guidance. If the remediation site is not located at a major facility as defined in IDAPA 58.01.01.006.55, uncontrolled VOC emissions must be less than 100 T/yr to use this guidance.

IV. CALCULATE UNCONTROLLED BENZENE LEVELS IN AIR EMISSIONS

Enter the ft^3/min from III.A above, and enter the benzene concentration. You must conduct a pilot test to determine the expected maximum benzene emissions rate for the vapor extraction system.

_____ ft^3/min x _____ micrograms per liter (max. value detected) x 9.0E-5 = _____ lbs/day benzene

If benzene emissions are less than or equal to 0.192 lb/day (which includes the short term emission factor as defined in IDAPA 58.01.01 210.15), control of benzene air emissions shall not be required. In this case, it is recommended you complete this form and return it to Department of Environmental Quality, Air Program Office, 1410 N. Hilton, Boise, ID 83706-1290.

If benzene emissions are greater than 0.192 lbs/day and less than 15 lbs/day, certain minimum stack requirements must be met. Continue to Section VI of this form to determine minimum stack parameters for a given design.

If benzene emissions are greater than 15 lbs/day, control of benzene air emissions is required using one of the following methods: catalytic oxidation, thermal oxidation or carbon canisters. Continue to Section V of this form.

V. CALCULATE CONTROLLED BENZENE EMISSIONS RATE

Describe the type of emissions control you propose to use and the source of control efficiency rating (e.g., manufacturer's guarantee): _____

Controlled benzene emissions = _____ lbs/day x (1 – control efficiency) = _____ lbs/day benzene

If the controlled benzene emission rate is less than or equal to 15 lbs/day, continue to Section VI. If the controlled benzene emission rate is greater than 15 lbs/day, contact the Department Air Program Office, (208) 373-0502.

VI. DETERMINATION OF MINIMUM VAPOR EXTRACTION STACK PARAMETERS

To use the tables instead of conducting site-specific modeling, if the proposed operation has emission values, air flows, and stack parameters which are shown in the tables (interpolation allowed), a minimum stack temp. of 298 K, and no more than one significant structure, which is a structure that is within a 5L radius of the stack, where L = the lesser of the structure's height or width. Otherwise, site-specific air dispersion modeling is required that demonstrates an ambient air benzene concentration of less than 1.2 $\mu g/m^3$ (annual average) (point of compliance as defined in IDAPA 58.01.01.210.03.b).

A. Refer to Tables 1 through 12. These flow rates are for emissions exiting the stack. A short-term factor of 10 has been built into both table sets. Record the stack height, stack inner diameter, and the table used to determine the stack flow rate. If the tables do not list the actual stack height, use the table with the next lowest stack height. If the proposed stack exit is not circular, a surrogate diameter is calculated using the total area of the exit (i.e. AREA = $\pi d^2/4$, where d is the effective stack diameter).

Stack Height: _____ ft Stack Diameter: _____ in. Table Used: _____

B. Using the benzene emissions rate (pounds per day) and the stack diameter (inches), find the minimum stack flow rate for the operation from the appropriate table. Interpolation of applicable flow rates is acceptable.

_____ft^3/min

The recorded value is the minimum required stack flow rate, using this screening method, for the proposed vapor extraction operation at this site. It is recommended that this form be completed and returned to Department of Environmental Quality, Air Program Office, 1410 N. Hilton, Boise, ID 83706-1290, for review.

VII. RECORDKEEPING REQUIREMENTS

Records are required to be kept in accordance with IDAPA 58.01.01.220.02.

VIII. SIGNATURE AND CONTACT INFORMATION

Remediation sources exempting through this process will be required to document emissions rate and actual stack flow rate during the initial two months of operation and to provide that documentation to the Department upon request (IDAPA 58.01.01.220.02). Stack flow rates below those recorded above may result in further emissions limitations. The Department may, in its sole discretion, require modification to any project plans in order to protect public health. The applicant and preparer of this document are responsible for the accuracy of the information provided. Material omission or submission of false information shall be sufficient for the Department to require the applicant to cease all operations until a valid permit is obtained.

Signature of Preparer:	Date:
Title:	Telephone

Based on information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate, and complete.

Signature of Responsible Official:	Date:
Title:	Telephone

AIR STRIPPING EXEMPTION FORM

Company/Facility Name:
Facility Address:

Please include a to-scale plot plan with emission(s) point(s) and location of sensitive receptor(s), if any.

I. RCRA APPLICABILITY

Verify compliance with all applicable RCRA Regulations (see Figure 1, RCRA Regulatory Status of Contaminated Media flowchart). This guidance can only be used in compliance with RCRA regulations.

II. PRESENCE OF SENSITIVE RECEPTORS

If the proposed air stripping site is located within 500 feet of a sensitive receptor as defined in IDAPA 58.01.01.007.10, contact the Department Air Program Office, (208) 373-0502.

III. CALCULATE UNCONTROLLED VOC LEVELS IN AIR EMISSIONS

A. Enter the flow rate of water into air stripper in gallons per minute. The proposed flow rate must have Department approval after interim operation. The proposed flow rate must be sufficient to adequately control, contain, and remove the petroleum contamination, or in the case of bio-remediation, be adequate to facilitate bio-remediation activity. Please attach documentation verifying Department approval of the proposed flow rate.

_____ gal/min x 3.785 l/gal = _____ l/min

B. Determine VOC concentration in groundwater. If free product, as defined in IDAPA 58.01.02.003.37, is present in any groundwater well associated with this petroleum release site, then you must conduct a pilot test (see "General Guidelines for Pilot Tests") to determine expected VOC concentrations. If free product is not present in any well, determine the VOC concentration in the groundwater by one of the following two methods:

a. Determine the VOC concentration from a groundwater well with the highest VOC concentration. Use only the most recent analysis.

b Conduct a pilot test to determine VOC concentrations.

Enter the VOC concentration and convert to tons per year VOC:

_____ ppb (micrograms per liter) x _____ l/min (from A) x 5.8E-7 = _____ T/yr VOC

C. If the remediation site is located at a major facility as defined in IDAPA 58.01.01.006.55, uncontrolled VOC emissions must be less than 40 T/yr to use this guidance. If the remediation site is not located at a major facility as defined in IDAPA 58.01.01.006.55, uncontrolled VOC emissions must be less than 100 T/yr to use this guidance.

IV. CALCULATE UNCONTROLLED BENZENE LEVELS IN AIR EMISSIONS

Enter the l/min from III.A above, and enter the benzene concentration, considering free product as described in III.B.

_____ l/min x _____ ppb (micrograms per liter) x 3.18E-6 = _____ lbs/day benzene

If benzene emissions are less than or equal to 0.192 lb/day (which includes the short term emission factor as defined in IDAPA 58.01.01.210.15), control of benzene air emissions shall not be required. In this case, it is recommended you complete this form and return it to the Department Air Program Office, 1410 N. Hilton, Boise, ID 83706-1290.

If benzene emissions are greater than 0.192 lbs/day and less than 15 lbs/day, certain minimum stack requirements must be met. Continue to Section VI of this form to determine minimum stack parameters for a given design.

If benzene emissions are greater than 15 lbs/day, control of benzene air emissions is required using one of the following methods: catalytic oxidation, thermal oxidation or carbon canisters. Continue to Section V of this form.

V. CALCULATE CONTROLLED BENZENE EMISSIONS RATE

Describe the type of emissions control you propose to use and the source of control efficiency rating (e.g., manufacturer's guarantee): _____

Controlled benzene emissions = _____ lbs/day x (1 – control efficiency) = _____ lbs/day benzene

If the controlled benzene emission rate is less than or equal to 15 lbs/day, continue to Section VI. If the controlled benzene emission rate is greater than 15 lbs/day, contact the Department Air Program Office, (208) 373-0502.

VI. DETERMINATION OF MINIMUM AIR STRIPPER STACK PARAMETERS

To use the tables instead of conducting site-specific modeling, if the proposed operation has emission values, air flows, and stack parameters which are shown in the tables (interpolation allowed), a minimum stack temp. of 298 K, and no more than one significant structure, which is a structure that is within a 5L radius of the stack, where L = the lesser of the structure's height or width. Otherwise, site-specific air dispersion modeling is required that demonstrates an ambient air benzene concentration of less than 1.2 $\mu g/m^3$ (annual average) (point of compliance as defined in IDAPA 58.01.01.210.03.b).

A. Refer to Tables 1 through 12. These flow rates are for emissions exiting the stack. A short term factor of 10 has been built into both table sets. Record the stack height, stack inner diameter, and the table used to determine the stack flow rate. If the tables do not list the actual stack height, use the table with the next lowest stack height. If the proposed stack exit is not circular, a surrogate diameter is calculated using the total area of the exit (i.e. AREA = $\pi d^2/4$, where d is the effective stack diameter).

Stack Height: _____ ft Stack Diameter: _____ in. Table Used: _____

B. Using the benzene emissions rate (pounds per day) and the stack diameter (inches), find the minimum stack flow rate for the operation from the appropriate table. Interpolation of applicable flow rates is acceptable.

_____ft^3/min

The recorded value is the minimum required stack flow rate, using this screening method, for the proposed air stripping operation at this site. It is recommended that this form be completed and returned to Department of Environmental Quality, Air Program Office, 1410 N. Hilton, Boise, ID 83706-1290, for review.

VII. RECORDKEEPING REQUIREMENTS

Records are required to be kept in accordance with IDAPA 58.01.01.220.02.

VIII. SIGNATURE AND CONTACT INFORMATION

Remediation sources exempting through this process will be required to document emissions rate and actual stack flow rate during the initial two months of operation and to provide that documentation to the Department upon request (IDAPA 58.01.01.220.02). Stack flow rates below those recorded above may result in further emissions limitations. The Department may, in its sole discretion, require modification to any project plans in order to protect public health. The applicant and preparer of this document are responsible for the accuracy of the information provided. Material omission or submission of false information shall be sufficient for the Department to require the applicant to cease all operations until a valid permit is obtained.

Signature of Preparer:	Date:
Title:	Telephone

Based on information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate, and complete.

Signature of Responsible Official:	Date:
Title:	Telephone

DISPERSION MODELING RESULT TABLES

Table 1
Stack Height = 10 ft, No Buildings

Benzene Emissions Rate lb/day)	Diameter 1 in	2 in	3 in	4 in	5 in.	6 in
0.192	28 cfm	56 cfm	84 cfm	113 cfm	140 cfm	170 cfm
1	163 cfm	330 cfm	490 cfm	660 cfm	820 cfm	985 cfm
2		645 cfm	960 cfm	1,280 cfm		
3						

Table 2
Stack Height = 15 ft, No Buildings

Benzene Emissions Rate (lb/day)	Diameter 1 in	2 in	3 in	4 in	5 in	6 in
0.192	6.4 cfm	13 cfm	19 cfm	26 cfm	36 cfm	48 cfm
1	115 cfm	225 cfm	335 cfm	450 cfm	565 cfm	695 cfm
2	260 cfm	520 cfm	765 cfm	1,020 cfm	1,285 cfm	1,545 cfm
3		775 cfm	1,160 cfm			

Table 3
Stack Height = 20 ft, No Buildings

Benzene Emissions Rate (lb/day)	Diameter 2 in	4 in
0.192	any	any
1	155 cfm	310 cfm
2	390 cfm	780 cfm
3	640 cfm	1,260 cfm
4	870 cfm	
5	1,090 cfm	

Table 4
Stack Height = 25 ft, No Buildings

Benzene Emissions Rate (lb/day)	Diameter 2 in	4 in
0.192	any	any
1	115 cfm	225 cfm
2	280 cfm	570 cfm
3	510 cfm	1,000 cfm
4	730 cfm	1,450 cfm
5	930 cfm	

Table 5
Stack Height = 30 ft, No Buildings

Benzene Emissions Rate (lb/day)	Diameter 2 in	4 in
0.192	any	any
1	70 cfm	140 cfm
2	205 cfm	410 cfm
3	390 cfm	780 cfm
4	590 cfm	1,180 cfm
5	780 cfm	

Table 6
Stack Height = 35 ft, No Buildings

Benzene Emissions Rate (lb/day)	Diameter 2 in	4 in
0.192	any	any
1	25 cfm	50 cfm
2	160 cfm	320 cfm
3	270 cfm	550 cfm
4	460 cfm	910 cfm
5	630 cfm	1,250 cfm

Table 7
Stack Height = 10 ft, One Building

Benzene Emissions Rate (lb/day)	Diameter 1 in	2 in	3 in	4 in	5 in	6 in
0.192	192 cfm	292 cfm	575 cfm	770 cfm	960 cfm	1,150 cfm
1		1,405 cfm				
2						
3						

1 Building, 100 ft x 100 ft
Building Height = 15 ft

Table 8
Stack Height = 15 ft, One Building

Benzene Emissions Rate (lb/day)	Diameter 1 in	2 in	3 in	4 in	5 in	6 in
0.192	56 cfm	113 cfm	167 cfm	225 cfm	280 cfm	335 cfm
1	320 cfm	645 cfm	960 cfm	1,290 cfm		
2		1,275 cfm				
3						

1 Building, 100 ft x 100 ft
Building Height = 15 ft

Table 9
Stack Height = 20 ft

Benzene Emissions Rate (lb/day)	Diameter 2 in	4 in
0.192	any	any
1	400 cfm	800 cfm
2	800 cfm	
3		
4		
5		

1 Building, 100 ft x 100 ft
Building Height = 15 ft

Table 10
Stack Height = 25 ft

Benzene Emissions Rate (lb/day)	Diameter 2 in	4 in
0.192	any	any
1	115 cfm	225 cfm
2	280 cfm	570 cfm
3	510 cfm	1,000 cfm
4	730 cfm	
5		

1 Building, 100 ft x 100 ft
Building Height = 15 ft

Table 11

Stack Height = 30 ft

Benzene Emissions Rate (lb/day)	**Diameter** 2 in	4 in
0.192	any	any
1	70 cfm	140 cfm
2	205 cfm	410 cfm
3	390 cfm	780 cfm
4	590 cfm	1,180 cfm
5	780 cfm	

1 Building, 100 ft x 100 ft
Building Height = 15 ft

Table 12

Stack Height = 35 ft

Benzene Emissions Rate (lb/day)	**Diameter** 2 in	4 in
0.192	any	any
1	25 cfm	50 cfm
2	160 cfm	320 cfm
3	270 cfm	550 cfm
4	460 cfm	910 cfm
5	630 cfm	1,250 cfm

1 Building, 100 ft x 100 ft
Building Height = 15 ft

GENERAL GUIDELINES FOR PILOT TESTS

Following are guidelines for conducting pilot tests to determine BTEX and VOC concentrations in ground water (benzene is used as an example) for air stripping and vapor extraction systems. It should be stressed that the guidelines for conducting pilot tests are just that—guidelines. Therefore, deviations are to be expected, based on site specific conditions. The primary point is that the conditions and details of any pilot test and testing procedures should be well documented and conducted pursuant to commonly acceptable scientific, engineering, and EPA and State of Idaho procedures.

For other technologies for which these guidelines may not be acceptable, modifications to the guidelines may be made pursuant to commonly acceptable scientific, engineering and EPA/Idaho procedures.

Pilot Test to Determine Benzene Emissions from Air Stripping Systems

Benzene emission rates associated with air stripping remediation operations are estimated using the benzene concentration in groundwater. These data are then used to determine whether air emissions from the air stripping equipment require controls. The Department of Environmental Quality (Department) has determined that a short term, full-scale pumping test with groundwater sampling is an appropriate method for determining the benzene concentration in groundwater in some cases. This procedure is required for determining benzene concentrations in groundwater when free product is present in monitoring or recovery wells. It is also an acceptable, but not required, method of determining benzene concentrations when free product is not present.

For purposes of this guidance, the term "pilot test" shall mean the process of pumping groundwater from the contaminated subsurface in the area targeted for remediation and collecting samples of the water for laboratory analysis to determine benzene concentrations prior to treatment by the air stripping equipment. The criteria contained herein are designed specifically as a means of determining the concentration of benzene in pumped groundwater. It may be possible to modify an aquifer test (designed to determine subsurface hydraulic parameters) conducted during site investigation work to obtain the same data.

Note that the Department does not require air stripping equipment to be installed prior to conducting the pilot test. The pilot test may be conducted at any time within the site investigation as long as the benzene concentration is not likely to increase appreciably over time and site conditions are expected to be comparable between the time of sampling and cleanup. The suggested criteria to be followed in performance of an acceptable pilot test are:

- Pumping is to take place from recovery well(s) expected to be used in the full-scale cleanup.

- The pumping rate is to be the same rate used in the full-scale cleanup. Usually, the pumping rate is approved by the Department UST/LUST Program through submission of a written cleanup plan.

- The pumping system is to operate continuously at the established rate for a minimum of two (2) hours and a maximum of twelve (12) hours. Upon completion of pumping, one (1) grab sample shall be collected and analyzed for benzene, toluene, ethyl benzene, and xylenes (BTEX).

- One (1) duplicate sample is to be collected and analyzed for BTEX. Duplicate sample analyses must result in a relative percent difference (RPD) of 25% or less; for two measurements (x_1 and x_2), the RPD is defined as: $[|x_1-x_2| \div (x_1+x_2)] \times 200 = RPD(\%)$.

- Samples are to be collected from the pumping system at a location representative of inflow to the air stripper but after any preliminary treatment equipment (i.e., oil/water separators, etc.).

- The laboratory analysis method must be an EPA-approved method and must have a lower detection limit of no greater than one (1) microgram per liter (ppb). Sampling must be conducted in accordance with the *RCRA Ground Water Monitoring Technical Enforcement Guidance Document* (National Water Well Association, 1992) or equivalent.

- Contaminated water generated during the pilot test must be treated or disposed of in a safe and acceptable manner. On-site storage prior to treatment system completion is acceptable as long as all applicable rules, regulations and ordinances are followed. The treatment and disposal of all generated wastes are the sole responsibility of the person(s) conducting the pilot test.

- Interim operation will be defined, for the purposes of this guidance, as a 90 day period of time beginning with the initiation of active remedial measures that are covered by this guidance and which are taking place in compliance with the provisions of IDAPA 58.01.02.852.06.c.i-iii. These would include, but are not limited to, bioventing, air sparging, soil vapor extraction, and groundwater pumping with air stripping. The operation of pilot tests would not start the 90 day period. Submittal of a corrective action plan, which incorporates the interim measures, should occur by the end of the 90 day period. Evaluation of the acceptability of air emissions of interim measures via these policies should still take place.

- Analytical methods for BTEX water analysis include EPA methods 8020, 8021, 8240, 602, 624, 502.2, and 524.2.

Pilot Test to Determine Benzene Emissions from Vapor Extraction Systems

Determination of benzene emission rates associated with soil vapor extraction systems is accomplished by performing a system pilot test. Data from the pilot test are then used to determine whether emission controls are needed. The following constitutes an acceptable vapor extraction pilot test for determining benzene emissions:

- Vapor is to be withdrawn from all recovery wells/trenches expected to be used in full-scale cleanup. As an alternative, vapor samples may be collected from a single extraction well/trench during a system development pilot test provided the extraction well/trench withdraws vapors from the region of highest contamination.

- The air flow rate expected to be used for the full-scale cleanup is to be maintained for twelve (12) hours. System operating parameters, including air flow rates, are normally approved by the Department UST/LUST Program through submission of a written cleanup plan.

- Shorter pilot tests may be conducted if site conditions allow pressure equilibrium to be obtained prior to twelve (12) hours.

- At the end of the twelve-hour extraction period (or shorter period if justified), two (2) samples of extracted air are to be collected and analyzed for total hydrocarbons, benzene, toluene, ethylbenzene, and xylenes (BTEX). One of the two samples is a quality control (QC) duplicate.

- One (1) duplicate sample is to be collected and analyzed for total hydrocarbons and BTEX. Duplicate sample analyses must result in a relative percent difference (RPD) of 25% or less; for two measurements (x_1 and x_2), the RPD is defined as: $[|x_1-x_2| \div (x_1+x_2)] \times 200 =$ RPD(%).

- The analyses is to be conducted by a laboratory capable of meeting industry-standard quality assurance/quality control (QA/QC) objectives. The method used shall have a minimum detection limit for total hydrocarbons and each BTEX component of at least one (1) microgram per liter. The laboratory selected for the analysis must be contacted prior to sample collection in order to obtain information on proper sampling protocol and sample equipment requirements.

- Interim operation will be defined, for the purposes of this guidance, as a 90 day period of time beginning with the initiation of active remedial measures that are covered by this guidance and which are taking place in compliance with the provisions of IDAPA 58.01.02.852.06.c.i-iii. These would include, but are not limited to, bioventing, air sparging, soil vapor extraction, and groundwater pumping with air stripping. The operation of pilot tests would not start the 90 day period. Submittal of a corrective action plan, which incorporates the interim measures, should occur by the end of the 90 day period. Evaluation of the acceptability of air emissions of interim measures via these policies should still take place.

For both of the above guidelines, the laboratory must be able to demonstrate that:

1. The number of analyses match the number of samples.
2. Appropriate analyses were performed within specified holding times.
3. Handling and chain-of-custody requirements were met.
4. QC data and/or audit results confirm that proper procedures were followed in the field and in the laboratory.
5. Calibration standards data were evaluated and determined to be acceptable.
6. Data were reported in proper units (micrograms per liter) and have reasonable values.
7. Methods exist to identify and treat questionable data or outliers.

GENERAL GUIDELINES FOR PETROLEUM REMEDIATION AIR EMISSION SAMPLING AND ANALYSIS

The purpose of this sampling guideline is to provide the owners, operators and remediation contractors with guidance in obtaining a representative gas sample generated during the remediation of petroleum-contaminated sites. These samples will be analyzed for total hydrocarbons, which would include all volatile organic compounds (VOC's) present during remediation activities at petroleum contaminated sites, and BTEX (benzene, toluene, ethyl benzene, and xylene). This information will be used to determine the site status as defined in IDAPA 58.01.01.006.55 *Rules for the Control of Air Pollution in Idaho* and the potential impacts to the public and the environment by toxic air pollutants as well as provide operational information on the performance of the remediation system.

This sampling method guidance was based on currently accepted EPA field sampling procedures and on the sampling method found in California Air Resources Board Method (CARB) 410B, published in March 1986. The CARB method was also published by EPA as Conditional Test Method CTM-014 on December 2, 1992. The total hydrocarbon analyses can be performed using NIOSH Method 1500. These samples can be analyzed for BTEX using a gas chromatograph (GC)/flame ionization detector (FID).

Field Sampling Procedures

The soil gas sample should be collected from the discharge stack using a portable sample pump and Tedlar or aluminized Mylar bag. Ensure the soil vapor extraction system and the flowmeter are functioning. Connect the probe to the sample line. Connect the sample line to the valve, then to the vacuum pump and bag. Start the pump, open the valve, and fill the sample bag to capacity. The bag fill time is not critical. During sampling, monitor and record the effluent flow rate from the stack. When sampling is complete, put each bag in a rigid leakproof container for transportation to the analytical facility.

Required Field Sampling Equipment

- Probe- Stainless steel, glass, or Teflon tubing according to stack temperature. A glass wool plug can be used to remove particulate matter.
- Sample Line- Teflon tubing of sufficient length to connect probe to bag.
- Sample Container- Tedlar or aluminized Mylar bags large enough to contain the sample (a minimum of 2 one liter or larger samples required).
- Rigid leakproof containers to contain the bags.
- Pump- A vacuum pump to draw the sample from the stack.
- Flowmeter- A calibrated flowmeter to measure the effluent flow rate from the stack in CFM. This is necessary to determine the total hydrocarbon emission rate.
- Valve (Optional)- To control the sample flow rate to the bag.

Quality Assurance/Quality Control

The responsible sampling personnel should prepare and implement a formal quality assurance/quality control (QA/QC) project plan in order to assure the quality and integrity of the data collected. A brief listing of key EPA QA/QC guidance documents is presented below.

> *Guidance for Preparation of Combined Work/Quality Assurance Project Plans for Environmental Monitoring* (U.S. EPA, OWRS QA-1, May 1984)
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> *Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans* (U.S. EPA, QAMS 005/80, December 1980)
>
> *Quality Assurance/Quality Control Guidance for Removal Activities, Sampling QA/QC Plan, and Data Validation Procedures* (U.S. EPA, EPA-540/G-90/004, April 1990)

Specific QA/QC activities will include use of trip blanks, duplicates, and field blanks to support sample quality assurance/quality control activities. In addition, documentation of daily field instrument calibrations, sampling procedures, sampling conditions, and system operation will need to be performed. As a general statement, the more thorough and complete the documentation regarding the sampling and analysis actions, the higher the quality and value of the data collected.

Sampling Schedule

A soil vapor extraction (SVE) system's recovery of organic vapors is highly variable dependent upon several factors including chemical properties, soil properties (e.g., permeability, water content, etc.), and system operational parameters. Given the high variability over time, the example sampling frequency presented in Table 1 can be used when an extended sampling frequency is advisable or required and is intended to allow determination of the approximate peak concentration and downward trend in vapor concentrations during system operation. Modifications to this schedule may be required to accommodate site-specific conditions (e.g, extending the time-frame for sites with low recovery rates). The sampling schedule should be constructed to fit the operational conditions and reasons for the sampling and analysis.

Operational Considerations

Operational considerations need to be assessed in the implementation of the sampling and analysis protocol. For example, extended shutdowns and/or pulsed operation of the system will impact measured soil gas concentrations. More frequent monitoring may therefore be warranted in order to characterize any secondary peaks in soil gas organic concentrations.

If an emissions control system is used, the system will require monitoring in order to determine effectiveness, efficiency, and potential operating life.

Table 1. Example Sampling Frequency

Time Period	Samples
Day 1	2 per day, minimum 4 hours apart
Day 2	2 per day, minimum 4 hours apart
Day 3	2 per day, minimum 4 hours apart
Day 4	2 per day, minimum 4 hours apart
Day 5	2 per day, minimum 4 hours apart
Day 6	2 per day, minimum 4 hours apart
Day 7	2 per day, minimum 4 hours apart
Day 8 to Day 14	1 per day
Day 15 to Day 30	1 per 3 days
Day 31 to Day 60	1 per 5 days
Day 61 to end	1 per 7 days
Exceptions:	
Weekends	1 per day
After system shutdowns > 12 hours in duration	1 per day, for 3 days after shutdown

REGULATORY REVIEW

This guidance is written based on the *Rules for the Control of Air Pollution in Idaho* (IDAPA 58.01.01)(*Rules*). The applicable sections of the *Rules* are discussed below:

DEFINITIONS:

58.01.01.006.34. Environmental Remediation Source. *A stationary source that functions to remediate or recover any release, spill, leak, discharge or disposal of any petroleum product or petroleum substance, any hazardous waste or hazardous substance from any soil, ground water or surface water, and shall have an operational life no greater than five (5) years from the inception of any operations to the cessation of actual operations. Nothing in this definition shall be construed so as to actually limit remediation projects to five years or less of total operation.*

58.01.01.007.10. Sensitive Receptor. *Any building or location occupied or frequented by persons who, due to age, infirmity or other health based criteria as defined by the Department, may be more susceptible to the deleterious effects of a toxic air pollutant(s) than the general population. Examples of sensitive receptors include, but are not limited to, elementary and secondary schools, licensed day care centers, playgrounds and parks, hospitals, clinics, and nursing homes.*

The existence of a sensitive receptor within 500 feet of the proposed action may trigger tighter Department scrutiny of risks at that site. This may result, at the Department's discretion, in requirements to mitigate the impact of the proposed action on the sensitive receptor.

58.01.01.210.03.b Point of Compliance. *The receptor site that is estimated to have the highest ambient concentration of the toxic air pollutant of all the receptor sites that are located either at or beyond the facility property boundary or at a point of public access; provided that, if the toxic air pollutant is listed in Section 586, the receptor site is not considered to be at a point of public access if the receptor site is located on or within a road, highway or other transportation corridor transecting the facility.*

A few of the other potentially applicable definitions that are not printed in this document are:

58.01.01.006.55. Major Facility

58.01.01.006.56. Major Modification

58.01.01.006.74. Potential to Emit/Potential Emissions

58.01.01.006.92. Significant

EXEMPTION REQUIREMENTS:

Section 58.01.01.210.16, Demonstration of Preconstruction Compliance With Toxics Standards states:

IDAPA 58.01.01.210.16, Environmental Remediation Source

a. For Petroleum remediation sources subject to or regulated by the Resource Conservation and Recovery Act (42 U.S.C. Sections 6901-6992k) and the Idaho Rules and Standards for Hazardous Waste (IDAPA 58.01.05.000 et seq.) or the Comprehensive Environmental Response, Compensation and Liability Act (42 U.S.C. 6901-6992k) or a consent order, if the estimated ambient concentration at the point of compliance is greater than the acceptable ambient impacts listed in Sections 585 and 586, Best Available Control Technology shall be applied and operated until the estimated uncontrolled emissions from the remediation source are below the acceptable ambient concentration.

b. For Remediation sources not subject to or regulated by the Resource Conservation and Recovery Act (42 U.S.C. Sections 6901-6992k) and the Idaho Rules and Standards for Hazardous Waste (IDAPA 58.01.05.000 et seq.) or the Comprehensive Environmental Response, Compensation and Liability Act (42 U.S.C. 6901-6992k) or a consent order, shall, for the purposes of these rules, be considered the same as any other new or modified source of toxic air pollution.

c. For an environmental remediation source that functions to remediate or recover any release, spill, leak, discharge or disposal of any petroleum product or petroleum substance, the Department may waive the requirements of Section 513 of these rules.

To obtain an exemption from the requirement to obtain a permit for a remediation source, a Category II exemption is used:

220. GENERAL EXEMPTION CRITERIA FOR PERMIT TO CONSTRUCT EXEMPTIONS.

01. General Exemption Criteria. *Sections 220 through 223 may be used by owners or operators to exempt certain sources from the requirement to obtain a permit to construct. Nothing in these sections shall preclude an owner or operator from choosing to obtain a permit to construct. For purposes of Sections 220 through 223, the term source means the equipment or activity being exempted. No permit to construct is required for a source that satisfies all of the following criteria, in addition to the criteria set forth at Sections 221, 222, or 223:*

a. The maximum capacity of a source to emit an air pollutant under its physical and operational design without consideration of limitations on emission such as air pollution control equipment, restrictions on hours of operation and restrictions on the type and amount of material combusted, stored or processed would not:

i. Equal or exceed one hundred (100) tons per year of any regulated air pollutant..

ii. Cause an increase in the emissions of a major facility that equals or exceeds the significant emissions rates set out in the definition of significant at Section 006.

iii. Cause or significantly contribute to a violation of an ambient air quality standard, based upon the applicable air quality models, data bases, and other requirements of 40 CFR Part 51, Appendix W (Guideline on Air Quality Models). No demonstration under this subsection is required for those sources listed at Subsection 222.02.

b. Combination. The source is not part of a proposed new major facility or part of a proposed major modification.

222. CATEGORY II EXEMPTION

No permit to construct is required for the following sources.

Sections 222.01 through 222.02 are not applicable to this exemption and are not printed here. Continue to 222.03:

222.03.Any Other Source Specifically Exempted by the Department. *A list of those sources unconditionally exempted by the Department will be maintained by the Department and made available upon written request. All sources exempted by the Department shall:*

a. Be analyzed by the Department and determined to meet the requirements of Subsection 220.01.a.i and 220.01.a.ii.

b. Be analyzed by the Department and determined not to cause or significantly contribute to a violation of any ambient air quality standard."

To address the first requirement, 222.03.a, refer to Subsection 220.01.a.i and 220.01.a.ii:

a. The maximum capacity of a source to emit an air pollutant under its physical and operational design without consideration of limitations on emission such as air pollution control equipment, restrictions on hours of operation and restrictions on the type and amount of material combusted, stored or processed would not:

i. Equal or exceed one hundred (100) tons per year of any regulated air pollutant..

ii. Cause an increase in the emissions of a major facility that equals or exceeds the significant emissions rates set out in the definition of significant at Section 006.

Regarding Section 220.a.i, this guidance cannot be used if the VOC emissions from the source, not accounting for any control device (or uncontrolled), will equal or exceed 100 tons per year. If uncontrolled VOC emissions will equal or exceed 100 tons per year, then a permit is required.

Regarding Section 220.a.ii, if the remediation activity will occur at a major facility, and the uncontrolled VOC emissions from the remediation will equal or exceed 40 tons per year (significant net emissions increase as defined in IDAPA 58.01.01.006.56), then a permit is required.

Regarding Section 222.03.b, there is no ambient air quality standard for VOC, so this section is not applicable to petroleum remediation activities.

Petroleum remediation activities generally do not have emissions of regulated air pollutants other than VOCs. Of the VOCs, usually benzene is the pollutant that will cause an exceedance of the values listed in IDAPA 58.01.01.586 before any of the other constituents exceed their values. Therefore, benzene will be used as a surrogate, and if benzene is below the values listed in IDAPA 58.01.01.586, all other constituents are assumed to be well below their respective values. For this reason, this exemption process is based on the emissions of benzene.

For petroleum remediation sources that have emissions that do not exceed the levels specified in IDAPA 58.01.01.585 and 586, including any adjustment allowed using the short term factor, no emissions control is required. For sources that would exceed the allowable levels, this guidance includes the allowance to exempt using emissions control.

The rule for using the short term factor is as follows:

58.01.01.210.15. Short Term Source Factor. *For short term sources, the applicant may utilize a short term adjustment factor of ten (10). For a carcinogen, multiply either the applicable acceptable ambient concentration (AACC) or the screening emission rate, but not both, by ten (10), to demonstrate preconstruction compliance. This method may be used for TAPs listed in Section 586 only and may be utilized in conjunction with standard methods for quantification of emission rates (Subsections 210.05 through 210.08).*

This factor applies only to the benzene portion of BTEX.

The short term adjustment factor may be used in quantifying benzene emissions from petroleum remediation sources such as soil vapor extraction and air strippers with an operating life of five (5) years or less and is automatically included in the calculation on the attached Department forms.

All remediation projects exempted by this guidance shall be required to comply with IDAPA 58.01.01.220.02 as follows:

220.02 Record Retention*. Unless the source is subject to and the owner or operator complies with Section 385, the owner or operator of the source, except for those sources listed in Subsections 222.02.a. through 222.02.g., shall maintain documentation on site which shall identify the exemption determined to apply to the source and verify that the source qualifies for the identified exemption. The records and documentation shall be kept for a period of time not less than five (5) years from the date the exemption determination has been made or for the life of the source for which the exemption has been determined to apply, which ever is greater, or until such time as a permit to construct or an operating permit is issued which covers the operation of the source. The owner or operator shall submit the documentation to the Department upon request.*

For some sites such as abandoned or unoccupied sites, where it may be inadvisable to keep records on site, records may be kept at an alternate location as approved by the Department.

For the purposes of this project, multiple or confined technologies and/or emissions sources which are located on one or more contiguous or adjacent properties, and are owned or operated by the same

person or by persons under common control shall, for the purposes of quantifying emissions, be considered a single emission source.